

DOCUMENT RESUME

ED 141 105

SE 022 580

TITLE The 4M company: Make Mine Metric Mystery. Fifth Grade Student Booklet.

INSTITUTION Hawaii State Dept. of Education, Honolulu.; Hawaii Univ., Honolulu. Coll. of Education.

FUB DATE 76

NOTE 63p.; For related documents, see SE 022 570-583

AVAILABLE FROM Metric Project, University of Hawaii, 1776 University Ave., Honolulu, Hawaii 96822 (\$1.00)

EDRS PRICE MF-\$0.83 HC-\$3.50 Plus Postage.

DESCRIPTORS Elementary Education; *Elementary School Mathematics; *Instructional Materials; *Mathematics Education; *Metric System; Workbook

ABSTRACT

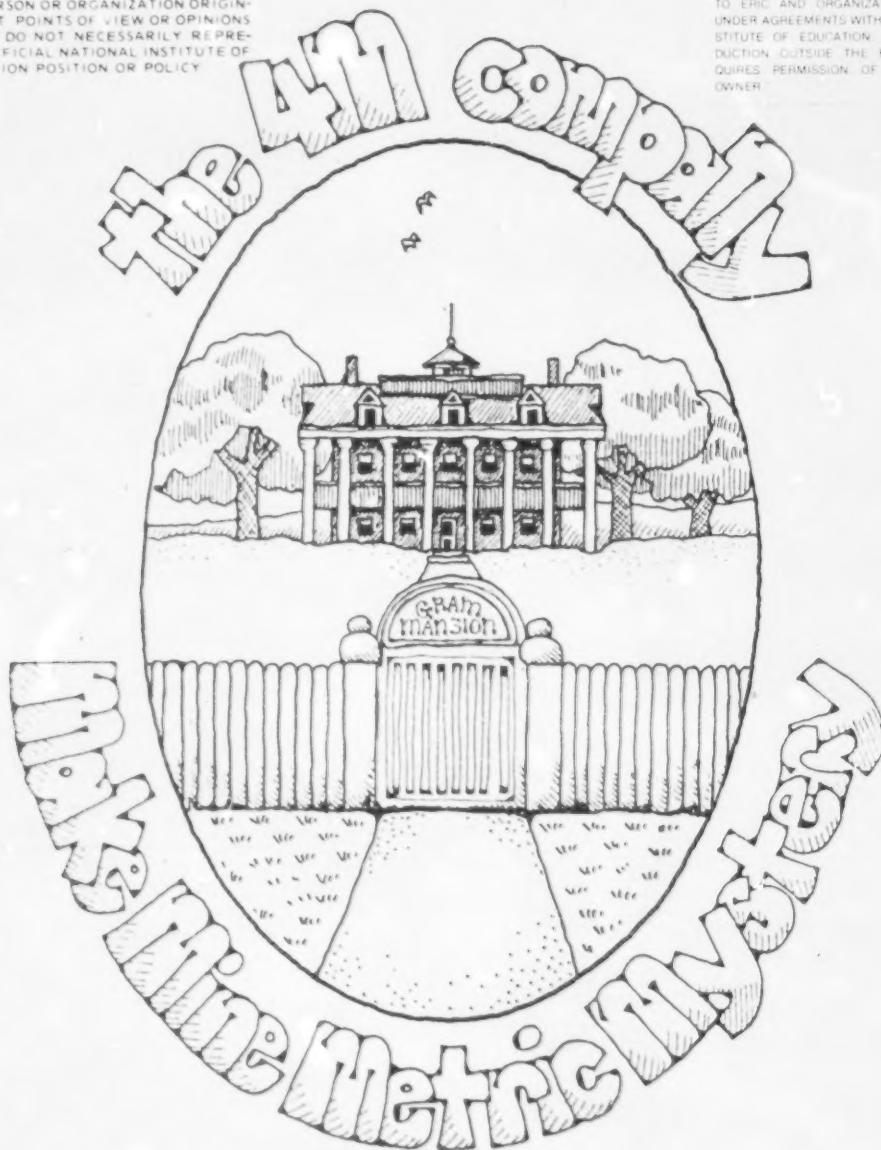
This student activity manual for elementary students is designed to teach several concepts related to the metric system and measurement. Included are activities related to length, area, volume, conversion of metric units, and computation skills with decimals (addition, subtraction, and division). Cartoons are used extensively to appeal to student interests. (RH)

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SE 022580

The 42nd Company

presents
the metric system
starring the

Make Mine Metric Mystery

project staff:

Irv King, Director

Kathleen Berg, Curriculum Planner

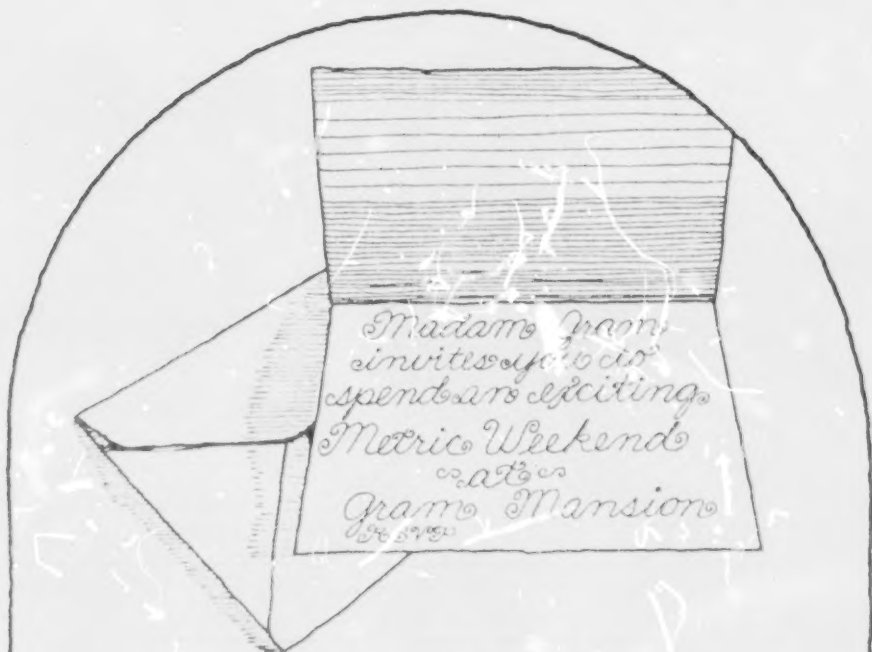
Kini Haines, Artist

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Black Mine Metric Mystery





WELCOME TO GRAM MANSION THE HOME OF THE FABULOUSLY WEALTHY MADAM GRAM. MADAM GRAM HAS AN INTERESTING HOBBY—THE METRIC SYSTEM—AND SHE HAS INVITED A GROUP OF FRIENDS TO SPEND A METRIC WEEKEND AT HER FANCY MANSION IN BEVERLY HILLS.

THE GUESTS INCLUDE: PROFESSOR BAXTER, A COLLEGE PROFESSOR; LITTLE MISS WATKINS, AN OLD MAID; COUNTESS RAVELLA, A BEAUTIFUL HEIRESS TO A LARGE FORTUNE; HENRY, MADAM GRAM'S PLAYBOY NEPHEW; RACQUEL BELCH, A GLAMOROUS MOVIE STAR; INSPECTOR KILOMBO, A FAMOUS TV DETECTIVE; AND YOU! PRISCILLA THE MAID, AND HER HUSBAND MILES, THE BUTLER, ROUND OUT OUR CAST OF CHARACTERS.

OUR MYSTERY BEGINS ON FRIDAY EVENING. ALL THE GUESTS HAVE ARRIVED AND HAVE ASSEMBLED IN THE LIBRARY...

the 4th company



ENGLISH SYSTEM

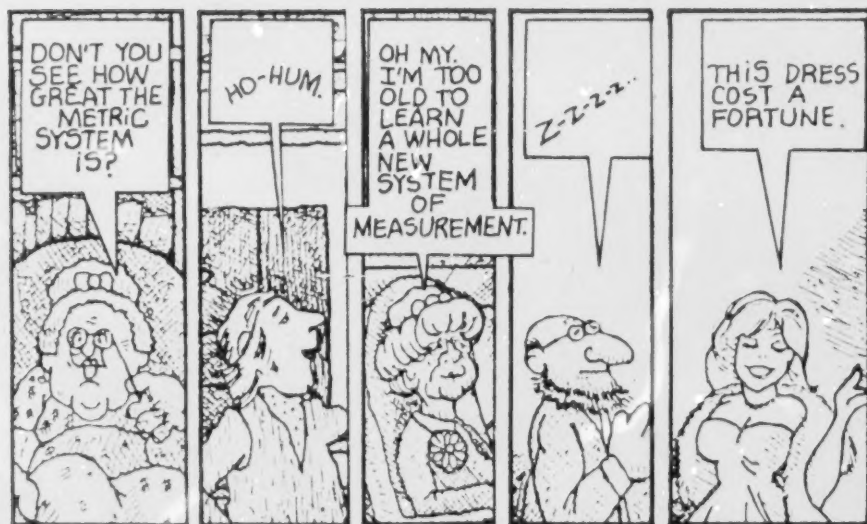


12 inches	→	1 foot
3 feet	→	1 yard
5½ yards	→	1 rod
40 rods	→	1 furlong
8 furlongs	→	1 mile
3 miles	→	1 league

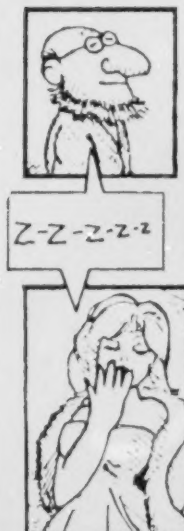
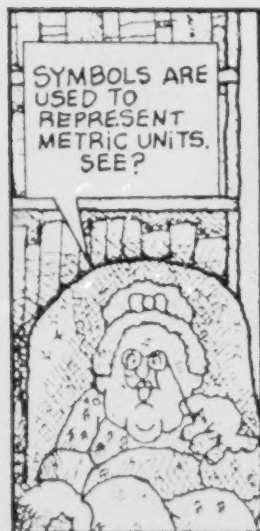
METRIC SYSTEM



10 millimeters	→	1 centimeter
10 centimeters	→	1 decimeter
10 decimeters	→	1 meter
10 meters	→	1 dekameter
10 dekameters	→	1 hectometer
10 hectometers	→	1 kilometer



	length	capacity	weight (mass)
1000	kilometer	kiloliter	kilogram
100	hectometer	hectoliter	hectogram
10	dekameter	dekaliter	dekagram
1	meter	liter	gram
0.1	decimeter	deciliter	decigram
0.01	centimeter	centiliter	centigram
0.001	millimeter	milliliter	milligram

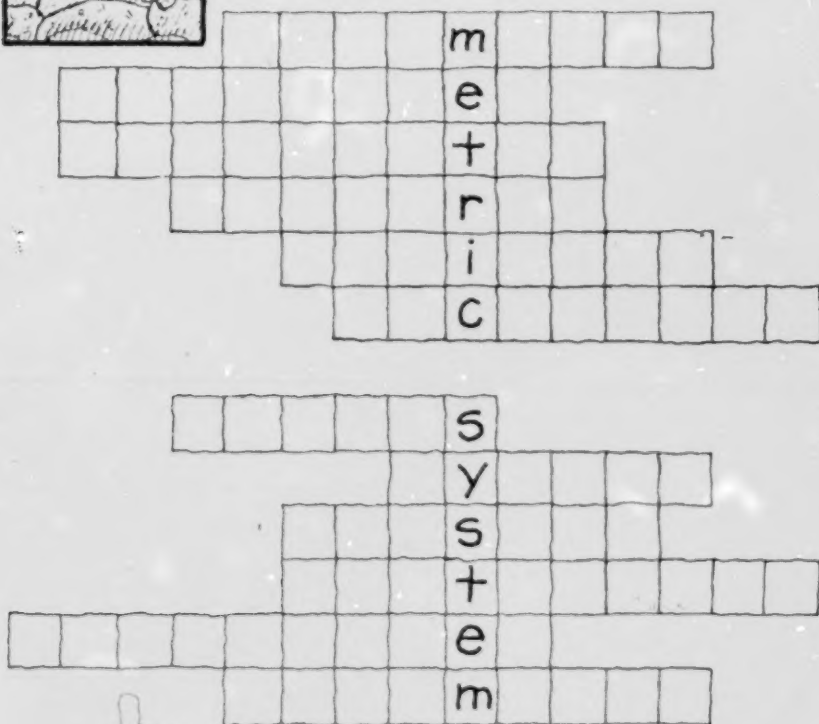


length capacity weight(mass)

1000	km	kL	kg
100	hm	hL	hg
10	dam	daL	dag
1	m	L	g
0.1	dm	dL	dg
0.01	cm	cL	cg
0.001	mm	mL	mg



HEY KIDS! MY GUESTS HAVE GONE TO THEIR ROOMS TO DRESS FOR DINNER. HELP ME DO THIS PUZZLE.



Fit these words into the puzzle.

centiliter
decimeter
decigram
deciliter

dekameter
hectoliter
hectometer
kilometer

kilogram
liters
system
measure

HELP!HELP!
SOMEONE HAS
JUST STOLEN
OUR METRIC
RULERS! ALL
OF THEM!



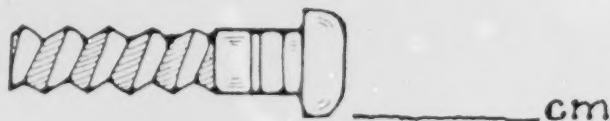
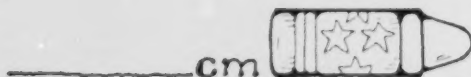
EVERYONE RUSHES TO THE KITCHEN
KILOMBO, THE FAMOUS DETECTIVE, TAKES CHARGE...

TELL US
EXACTLY
WHAT
HAPPENED,
PRISCILLA.



AS I CAME INTO THE
KITCHEN I SAW SOMEONE
SNEAK OUT THE BACK
DOOR. IT WAS DARK AND
I COULDN'T SEE WHO IT
WAS. THEN I NOTICED
THAT THE METRIC CABINET
WAS OPEN. THE RULERS
WERE MISSING.

Hey kids, you still have your rulers!
Measure these in centimeters.

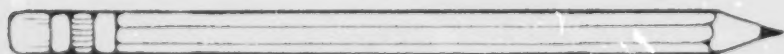
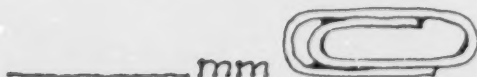


5

10



If your metric ruler isn't missing measure these in millimeters.





Choose 7 things to measure.

name of thing

its length

1.
2.
3.
4.
5.
6.
7.



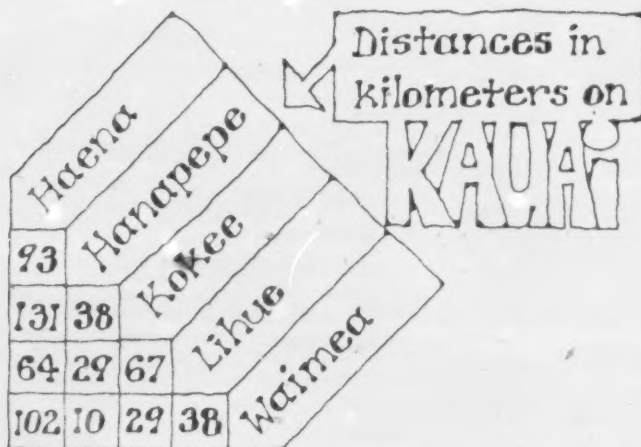
Akaka Falls to Kailua _____ km

Volcano House to Hilo _____ km

Waimea to City of Refuge _____ km

Kalapana to Hilo _____ km

City of Refuge to Waimea _____ km



Lihue to Hanapepe _____ km

Haena to Waimea _____ km

Kokee to Haena _____ km

Hanapepe to Waimea _____ km

Lihue to Kokee _____ km



1. _____
 2. _____
 3. _____
 4. _____

5. _____
 6. _____
 7. _____

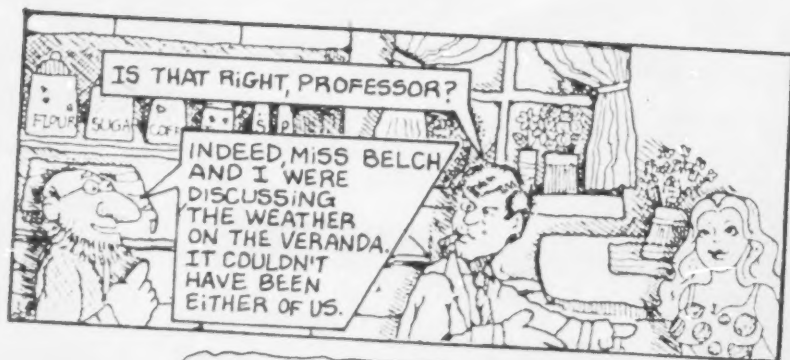
Tell how far it is from...

Kona to Oahu _____ km

Molokai to Maui _____ km

Maui to Lanai _____ km

Oahu to Kauai _____ km



Express as meters.

1. 2m and 75 cm _____ m
2. 5m and 47 cm _____ m
3. 9m and 15 cm _____ m
4. 8m and 6 cm _____ m
5. 45m and 38 cm _____ m
6. 4m and 9 cm _____ m
7. 0m and 79 cm _____ m
8. 14m and 24 cm _____ m
9. 27m and 51 cm _____ m
10. 67m and 62 cm _____ m

II



Measure seven things. Record to the nearest hundredth of a meter.

object

length

1.
2.
3.
4.
5.
6.
7.



Express as meters.

1. 10m and 273mm _____ m
2. 14m and 495mm _____ m
3. 27m and 607mm _____ m
4. 8m and 27mm _____ m
5. 1m and 7mm _____ m
6. 6m and 19mm _____ m
7. 45m and 103mm _____ m
8. 8m and 999mm _____ m
9. 11m and 772mm _____ m
10. 73m and 156mm _____ m



Measure seven things. Record to the nearest thousandth of a meter.

object

length

1.
2.
3.
4.
5.
6.
7.



Add.

$$\begin{array}{r} 7.412\text{m} \\ + 1.361\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 5.475\text{m} \\ + 2.123\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 2.123\text{m} \\ + 3.475\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 4.003\text{m} \\ + 3.040\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 9.147\text{m} \\ + 0.012\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 6.901\text{m} \\ + 1.014\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 14.125\text{m} \\ + 10.125\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 2.987\text{m} \\ + 0.111\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 0.001\text{m} \\ + 0.002\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 25.189\text{m} \\ + 0.001\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 2.176\text{m} \\ + 1.072\text{m} \\ \hline \end{array}$$

$$\begin{array}{r} 3.801\text{m} \\ + 1.009\text{m} \\ \hline \end{array}$$



1.999m
- 0.145m

2.888m
- 0.745m

7.777m
- 4.362m

6.666m
- 1.432m

5.555m
- 1.432m

4.444m
- 4.123m

9.876m
- 1.234m

7.797m
- 4.536m

8.808m
- 1.701m

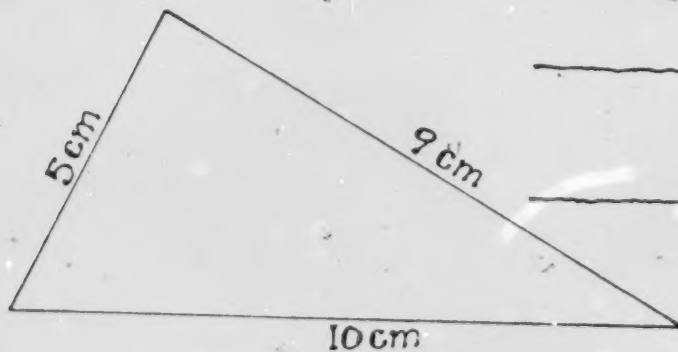
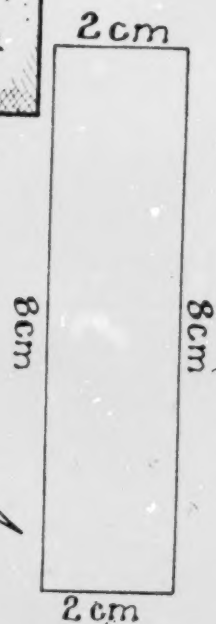
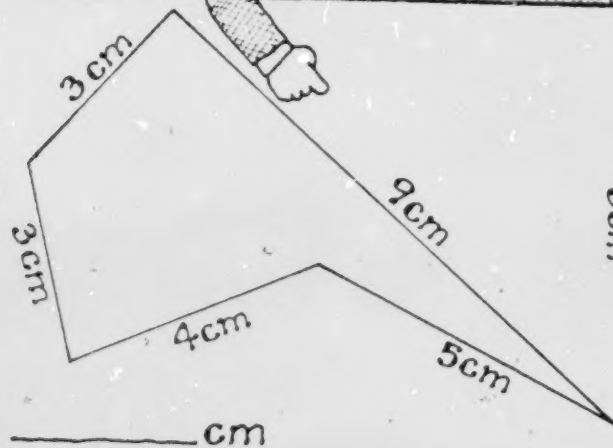
8.991m
- 1.119m

52.475m
- 14.126m

94.175m
- 93.175m

GOLLY, PROFESSOR, I DON'T THINK I KNOW WHAT "PERIMETER" IS!

WELL, IN MATH, PERIMETER MEANS THE DISTANCE AROUND A CLOSED FIGURE. LOOK HERE, MY DEAR.



10 cm

17

22

IF WE HAD A RULER, WE COULD FIND THE PERIMETER OF EACH FIGURE ON THIS PAGE.

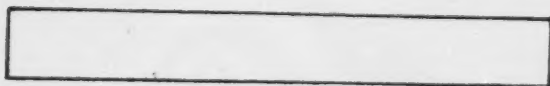
YOU'RE SO INTELLIGENT.



_____ cm



_____ cm



_____ cm



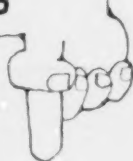
18

_____ cm

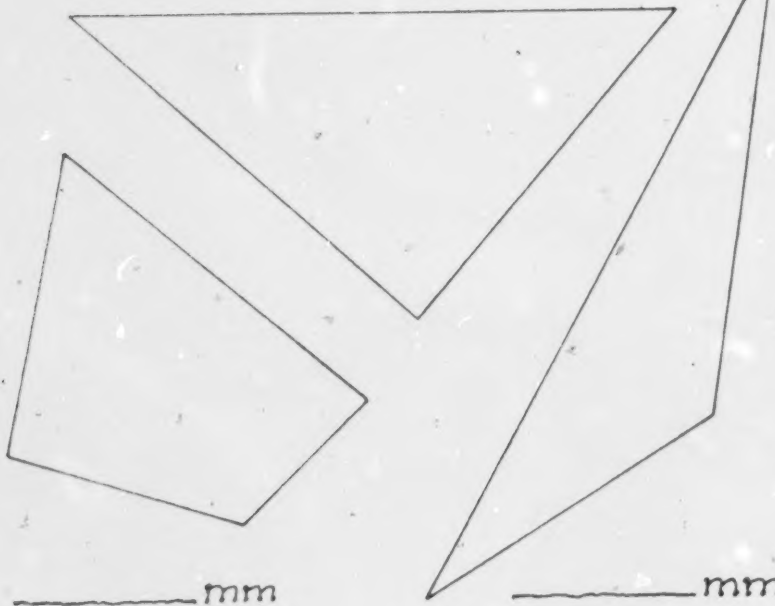
23



Use a ruler to find the perimeter in millimeters this time.



_____ mm





FLOOR FIGURES

FIGURE	1	_____
FIGURE	2	_____
FIGURE	3	_____
FIGURE	4	_____

Area is the amount of surface.
Squares are used for area.



Square decimeter (dm^2)

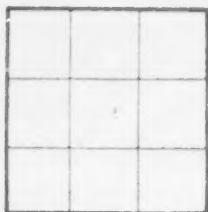
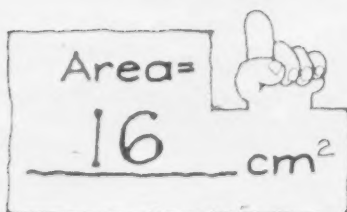
Square centimeter (cm^2)



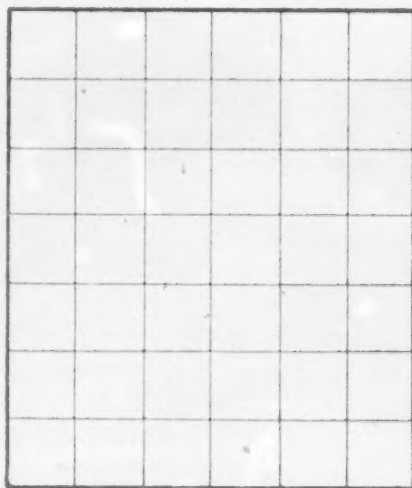
Square millimeter (mm^2)



1	2	3	4	5	6	7	8
16	15	14	13	12	11	10	9



_____ cm^2

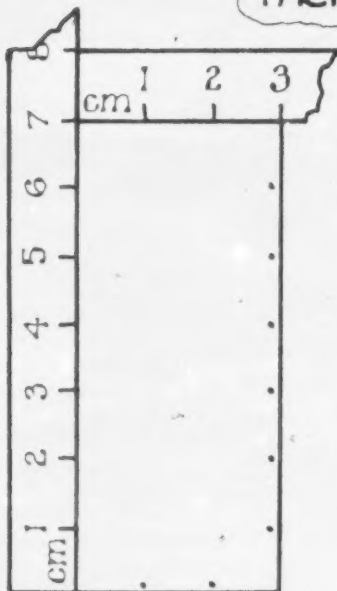


_____ cm^2

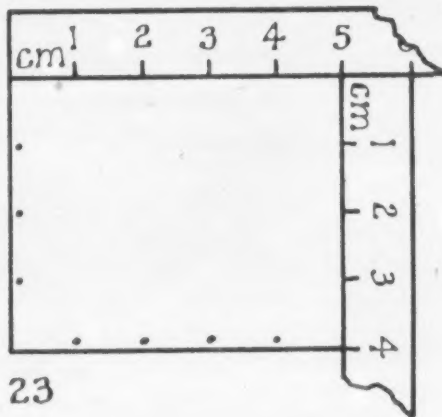


AREA

To find the area of a rectangle, measure then multiply.



How many cm^2 ?



23

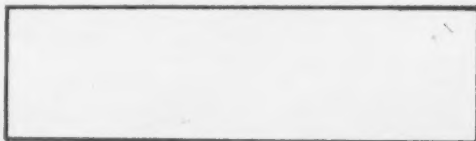
28



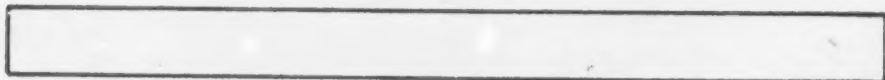
Use your cm ruler.



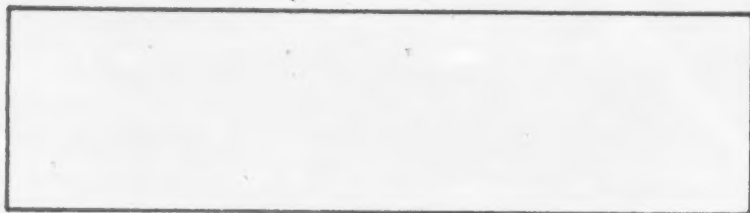
_____ cm²



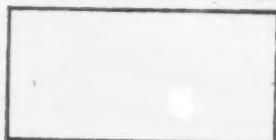
_____ cm²



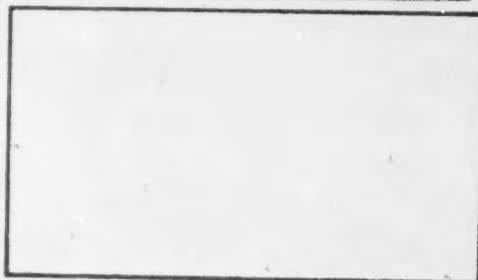
_____ cm²



_____ cm²



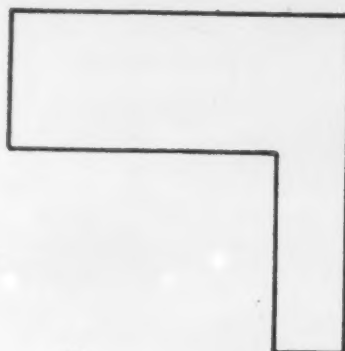
_____ cm^2



_____ cm^2



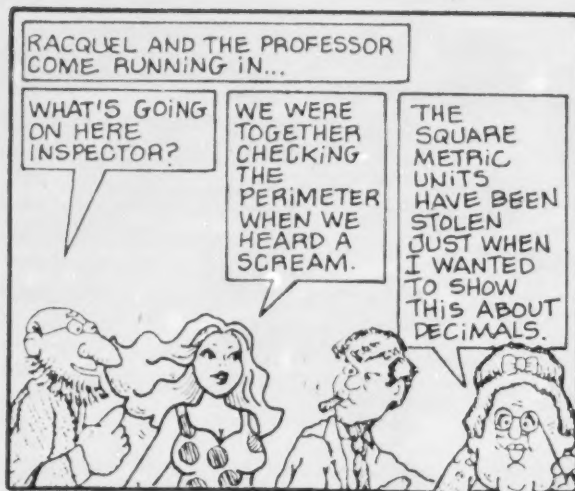
_____ cm^2



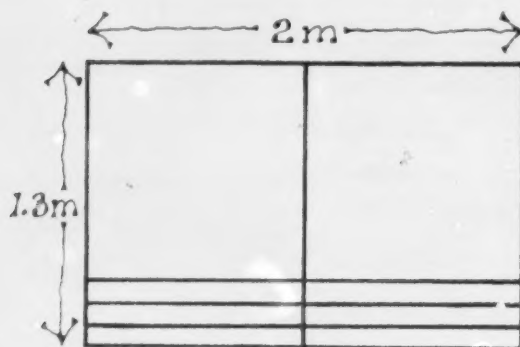
_____ cm^2

25

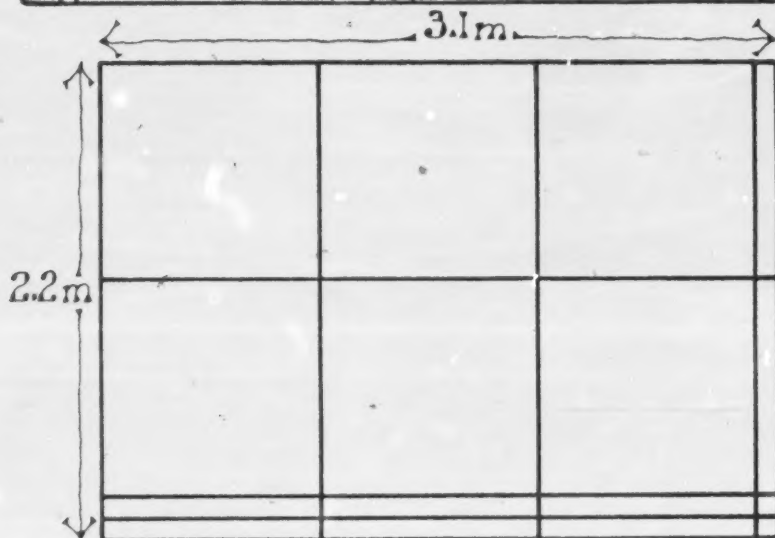
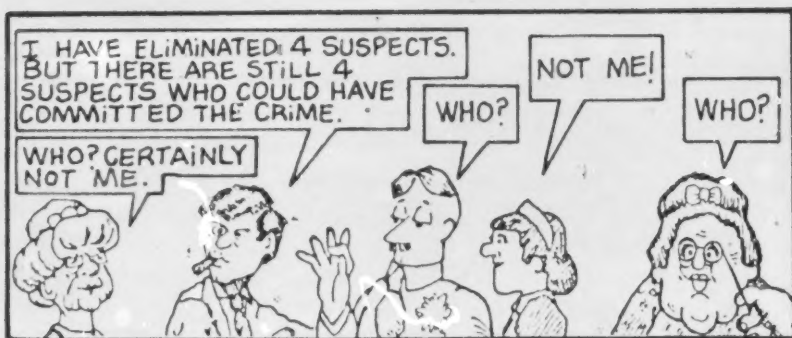
30



What is the **area** of this rectangle?



There are 2 square meters and 6 long rectangles. The area must be 2.6 m^2 .



There are 6 square meters.
 There are 8 long rectangles.
 There are 2 small squares.

6.82 m²



$$\begin{array}{r} 2.3 \\ \times 4 \\ \hline 92 \end{array}$$

$$\begin{array}{r} 3.3 \\ \times 1.2 \\ \hline 66 \\ 33 \\ \hline 396 \end{array}$$

$$\begin{array}{r} 4.63 \\ \times 5 \\ \hline 2315 \end{array}$$

$$\begin{array}{r} 1.257 \\ \times 0.4 \\ \hline 5028 \end{array}$$

$$\begin{array}{r} 2.07 \\ \times 1.4 \\ \hline 828 \\ 207 \\ \hline 2898 \end{array}$$

$$\begin{array}{r} 2.795 \\ \times 1.36 \\ \hline 16770 \\ 8385 \\ 2795 \\ \hline 380020 \end{array}$$

$$\begin{array}{r} 6.7 \\ \times 5 \\ \hline 335 \end{array}$$

$$\begin{array}{r} 1.456 \\ \times 0.2 \\ \hline 2912 \end{array}$$

$$\begin{array}{r} 2.999 \\ \times 3 \\ \hline 8997 \end{array}$$

28



$$\begin{array}{r} 5.6 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 2.5 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 3.7 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 5.1 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 2.12 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 3.45 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 1.23 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 4.06 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 0.132 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 2.156 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 5.014 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 6.132 \\ \times 8 \\ \hline \end{array}$$



It's bedtime for them, but for you it's...

ENCYCLOPEDIA TIME

Find the areas of these countries.*

MEXICO	_____	km ²
FRANCE	_____	km ²
ENGLAND	_____	km ²
THAILAND	_____	km ²
CHILE	_____	km ²

* Multiply square miles by 2.6 to get square kilometers.



?

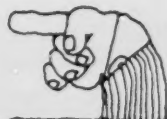
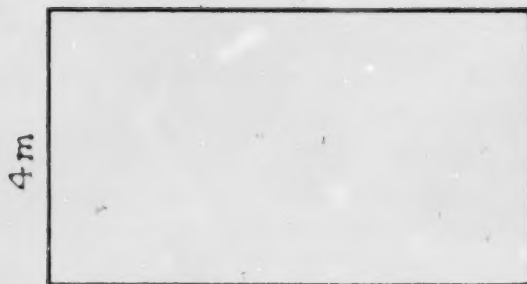


One side = 3 m
Area = 18 m²
Other side?

DIVIDE!

?

$$3 \overline{) 18} \begin{array}{r} 6 \end{array}$$

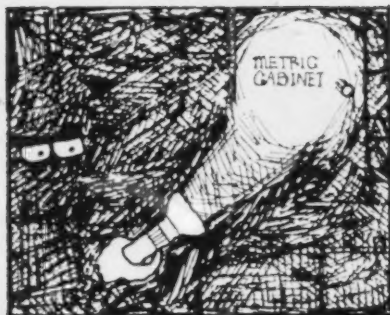


One side = 4 m
Area = 28.4 m²
Other side?

DIVIDE!

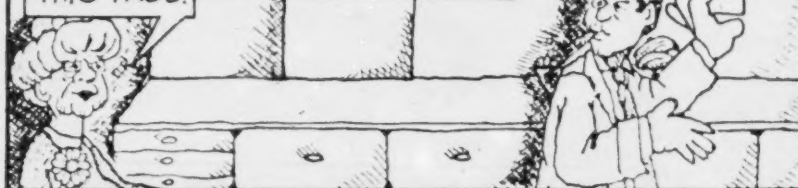
$$4 \overline{) 28.4} \begin{array}{r} 7.1 \\ 28 \\ \hline 4 \\ 4 \\ \hline 0 \end{array}$$

31



AHA! WHAT ARE YOU DOING UP AT THIS TIME OF NIGHT, MISS WATKINS?

I...I...I CAME DOWN TO PLACE THE DECIMAL POINT ON THE BOTTOM OF THIS PAGE.



Rectangle

One side
0.4m

Area = 0.64m^2

Divide

$$\begin{array}{r} 16 \\ 0.4 \overline{) 0.64} \\ \underline{4} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

Can you place
the decimal
point?



Place the decimal points for Miss Watkins.

$$\begin{array}{r} 223 \\ 0.6 \overline{) 13.38} \end{array}$$

$$\begin{array}{r} 455 \\ 0.7 \overline{) 3.185} \end{array}$$

$$\begin{array}{r} 661 \\ 1.9 \overline{) 125.59} \end{array}$$

$$\begin{array}{r} 601 \\ 4.5 \overline{) 270.45} \end{array}$$

$$\begin{array}{r} 333 \\ 9 \overline{) 299.7} \end{array}$$

$$\begin{array}{r} 66 \\ 1.03 \overline{) 67.98} \end{array}$$

$$\begin{array}{r} 321 \\ 3.69 \overline{) 11.8449} \end{array}$$

$$\begin{array}{r} 1236 \\ 0.3 \overline{) 0.3708} \end{array}$$

$$\begin{array}{r} 165 \\ 12 \overline{) 19.80} \end{array}$$

$$\begin{array}{r} 122 \\ 7.92 \overline{) 9.6624} \end{array}$$



$$3 \overline{)1.62}$$

$$4 \overline{)5.48}$$

$$5 \overline{)62.5}$$

$$5 \overline{)1.595}$$

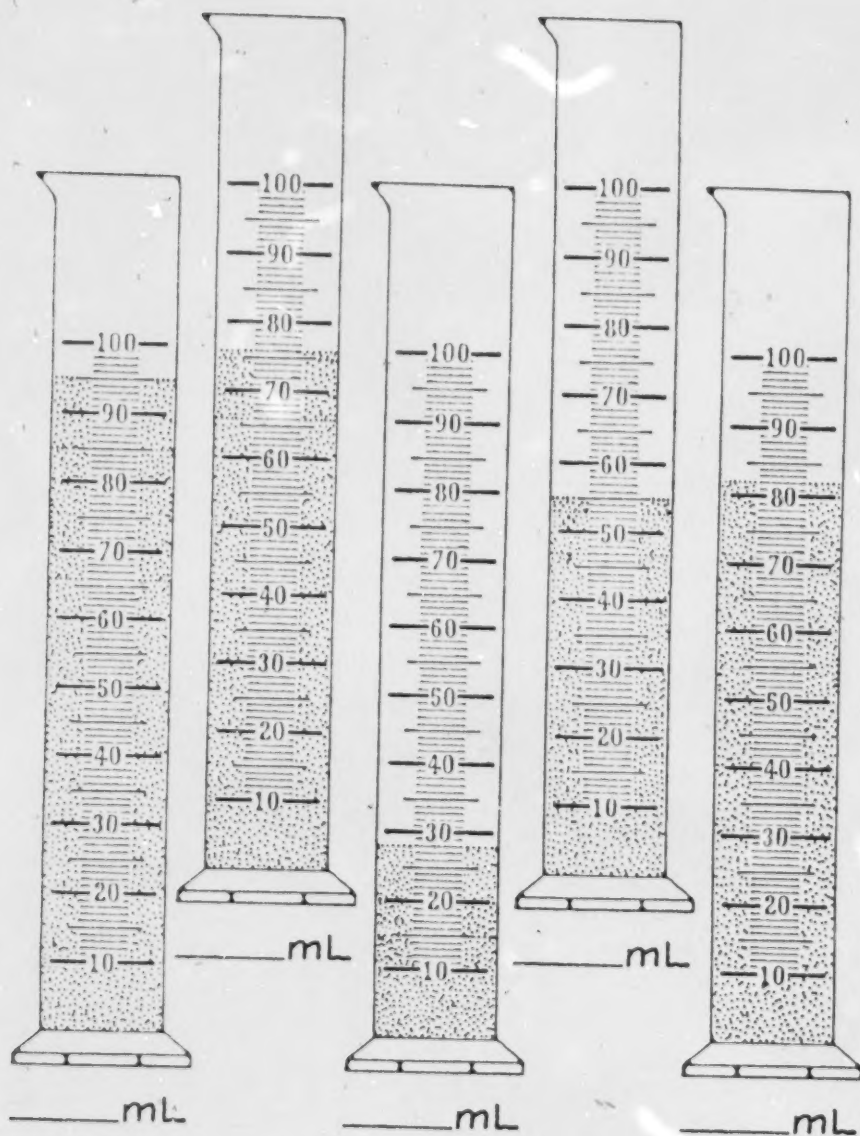
$$5 \overline{)4.25}$$

$$6 \overline{)10.26}$$

$$7 \overline{)5.53}$$

$$8 \overline{)8.48}$$

$$9 \overline{)20.07}$$



35

40



Container	A	holds _____ mL
Container	B	holds _____ mL
Container	C	holds _____ mL
Container	D	holds _____ mL
Container	E	holds _____ mL



Express as liters.

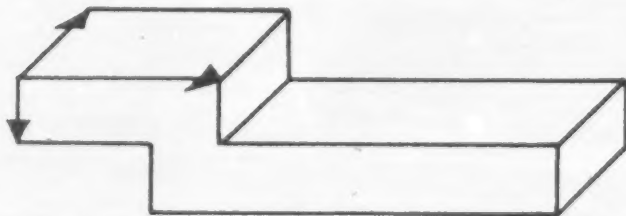
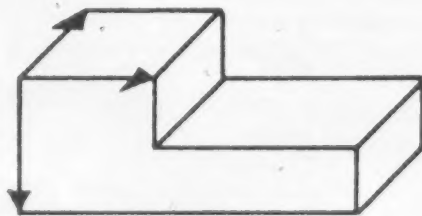
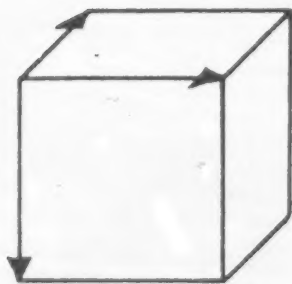
475mL = _____ L	752mL = _____ L
4863mL = _____ L	8476mL = _____ L
75mL = _____ L	53mL = _____ L
6mL = _____ L	9mL = _____ L
999mL = _____ L	13mL = _____ L
9007mL = _____ L	75016mL = _____ L
147mL = _____ L	187mL = _____ L



KIDS, WHILE KILOMBO INTERROGATES MY GUESTS LET'S GO TO THE LIBRARY AND STUDY SPACE FIGURES.

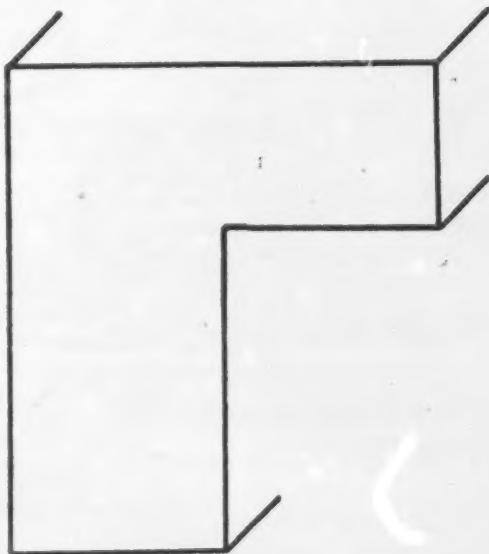
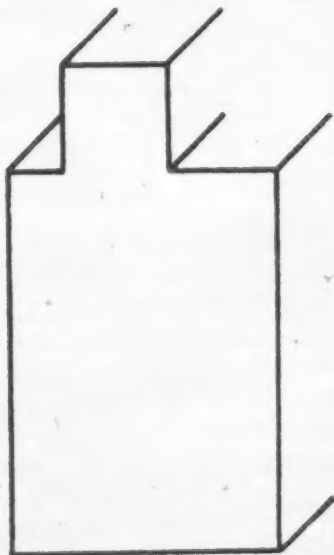
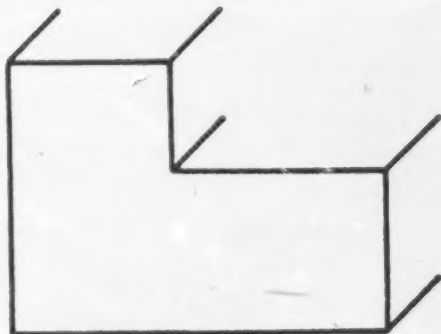
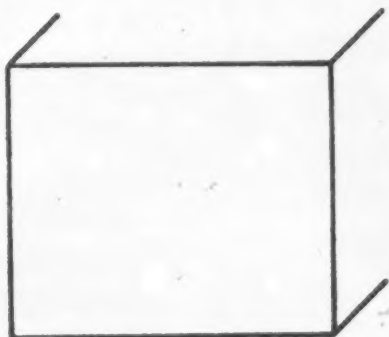
SPACE FIGURES

are three-dimensional.
From a given point we
go in three directions.

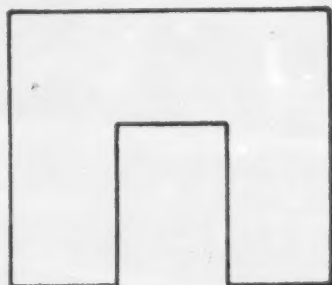
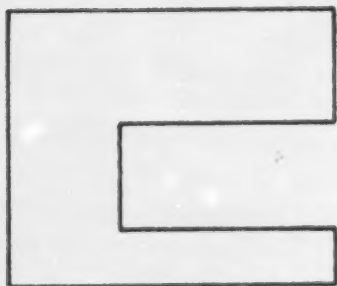
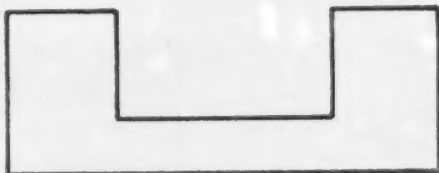




Can you make 3-D figures?
Part of it is done for you.



Can you make **3-D** drawings?



40

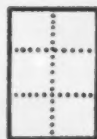
45

DRAWING CUBES

Step 1...
Draw a rectangle.



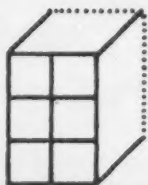
Step 2...
Divide it into six squares.



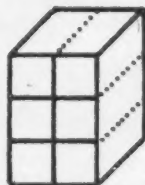
Step 3...
Draw parallel lines from verticals.



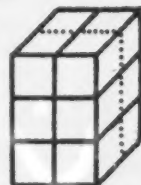
Step 4...
Connect endpoints.



Step 5...
Draw lines to show depth.



Step 6...
Draw lines to show layers.

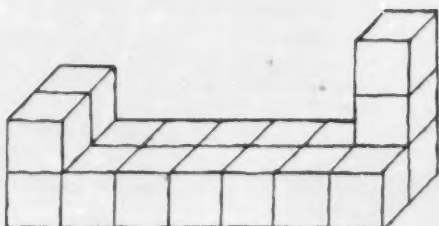
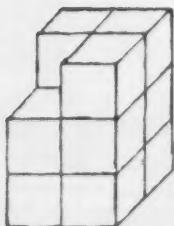
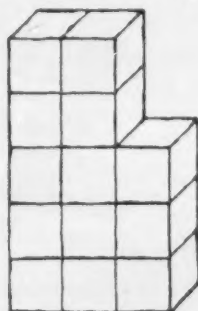
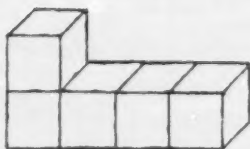
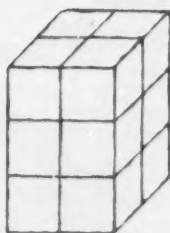


There are 12 cubes in all.

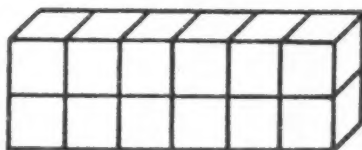
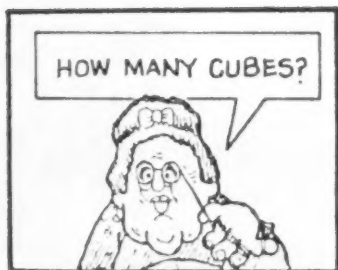




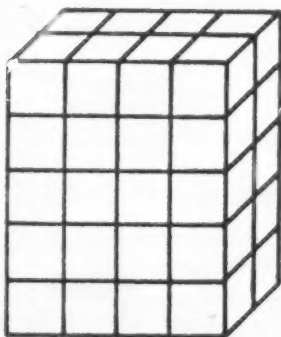
CAN YOU MAKE THESE WITH BLOCKS?
HOW MANY CUBES IN EACH FIGURE?



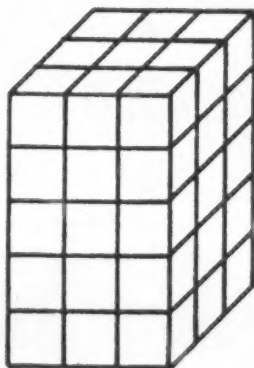
47
42



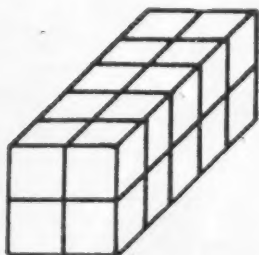
_____ cubes



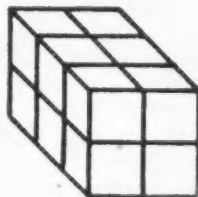
_____ cubes



_____ cubes



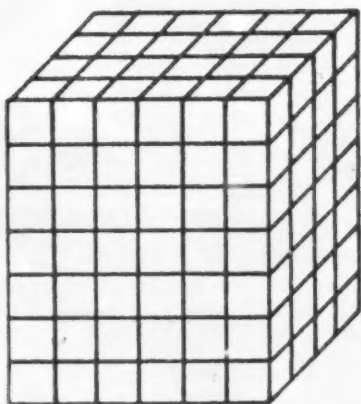
_____ cubes



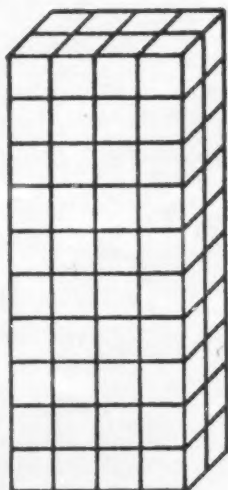
_____ cubes

43

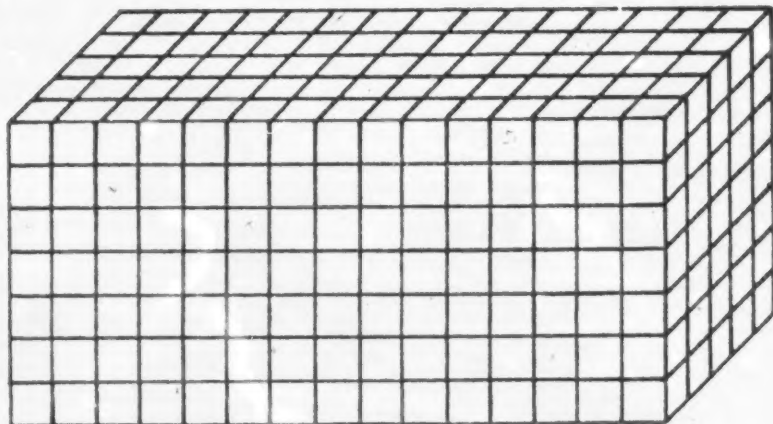
48



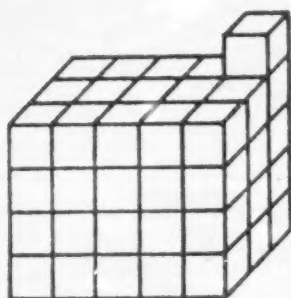
_____ cubes



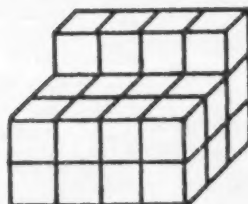
_____ cubes



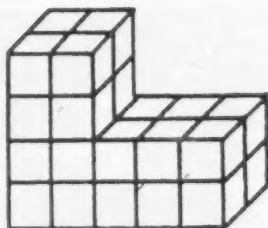
_____ cubes



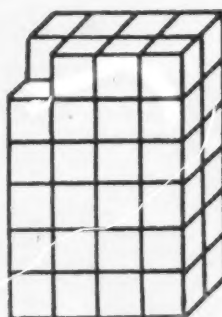
_____ cubes



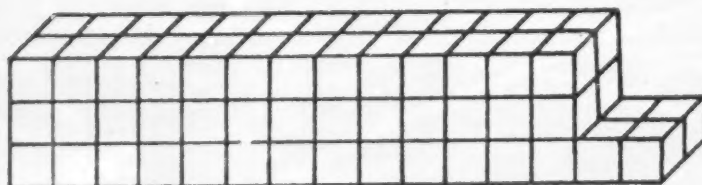
_____ cubes



_____ cubes



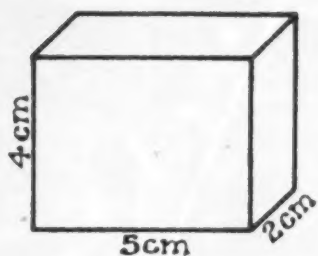
_____ cubes



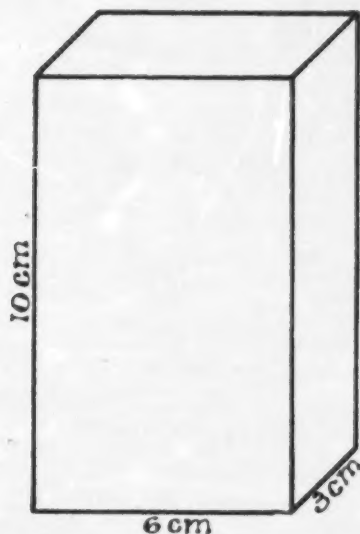
_____ cubes

45

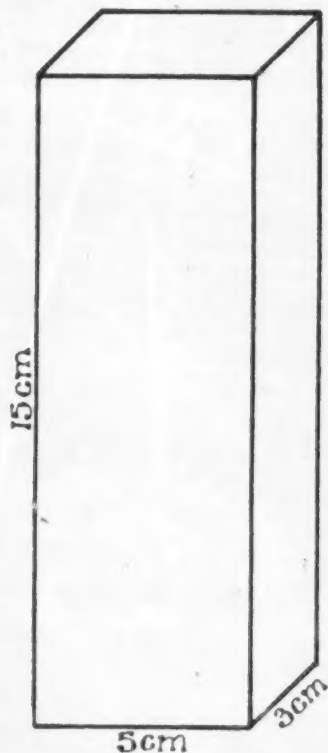
50



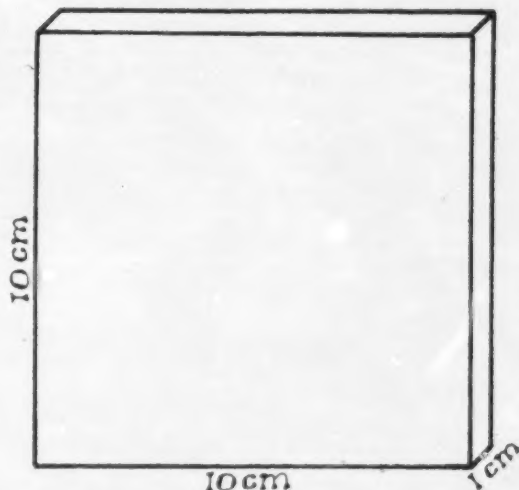
volume = _____ cm^3



volume = _____ cm^3

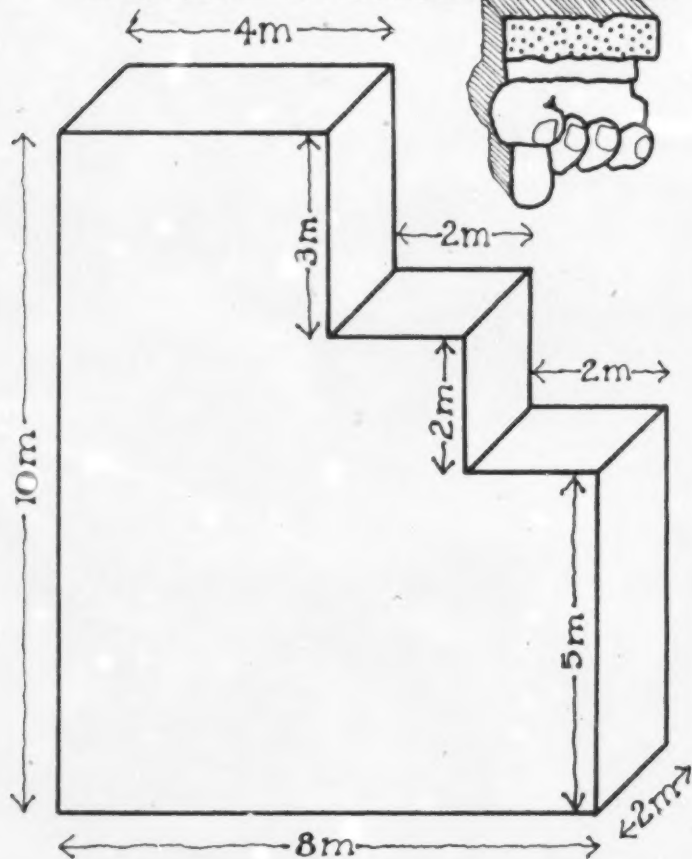


volume _____ cm^3



volume = _____ cm^3

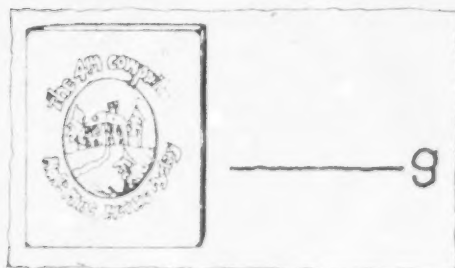
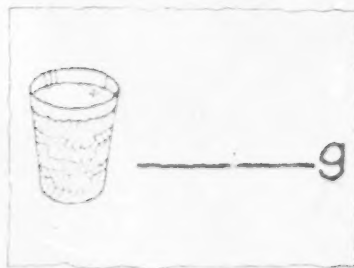
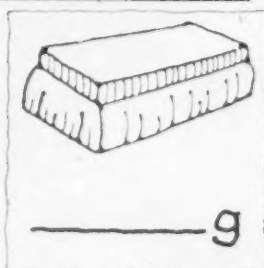
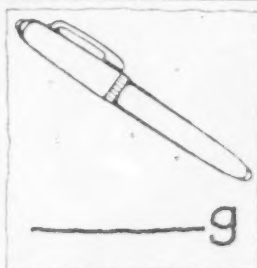
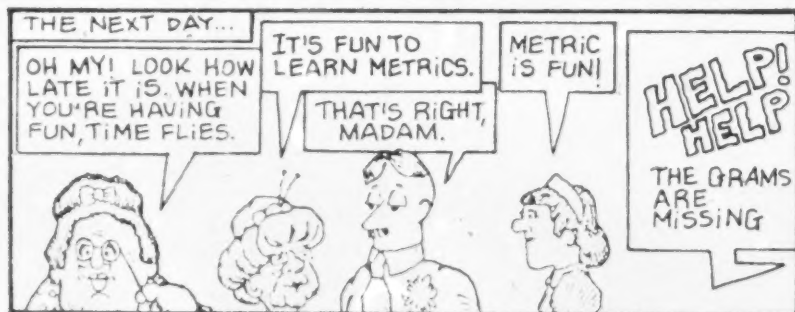
EXTRA CHALLENGE

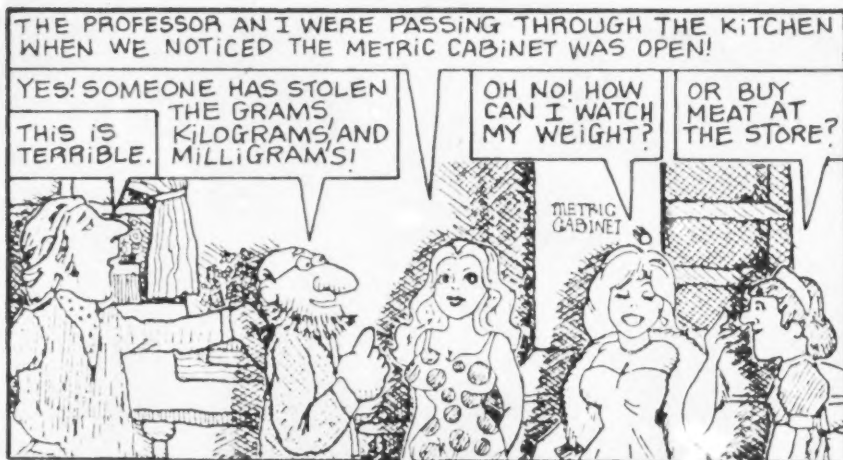


volume = _____ m^3

47

52





My name is _____.

I am _____ cm tall.

I weigh _____ kg.

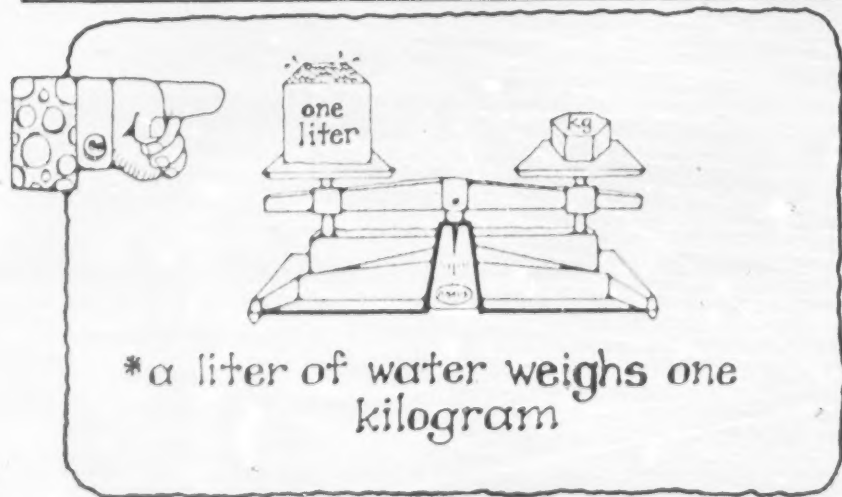
My foot is _____ cm long.

My arm muscle is _____ cm around.

My chest is _____ cm around.

My waist is _____ cm around.

My hips are _____ cm around.



GRAM

DECIGRAM

cg



Cut out these small weights.

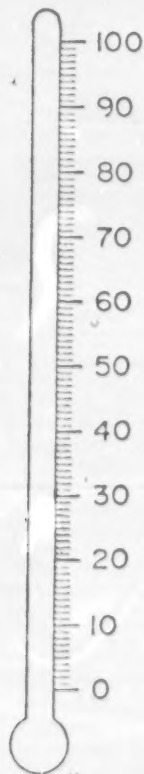
51

56

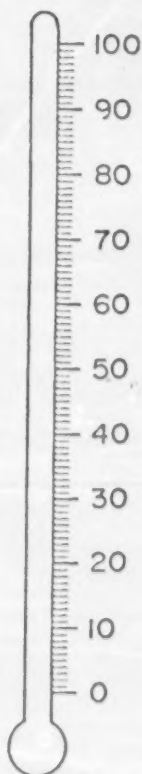
HOW ABOUT MISS
WATKINS, KILOMBO?
SHE ALWAYS SEEMS
TO BE NEAR THE
CRIME WHEN IT
HAPPENS.



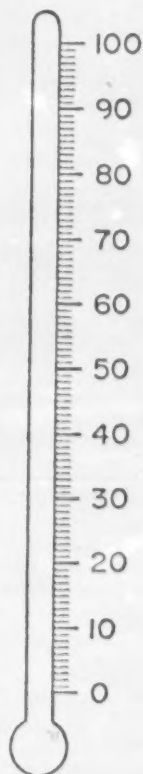
YEAH! MISS WATKINS
COULD BE IN A LOT
OF HOT WATER
UNLESS SHE HAS
A GOOD ALIBI.



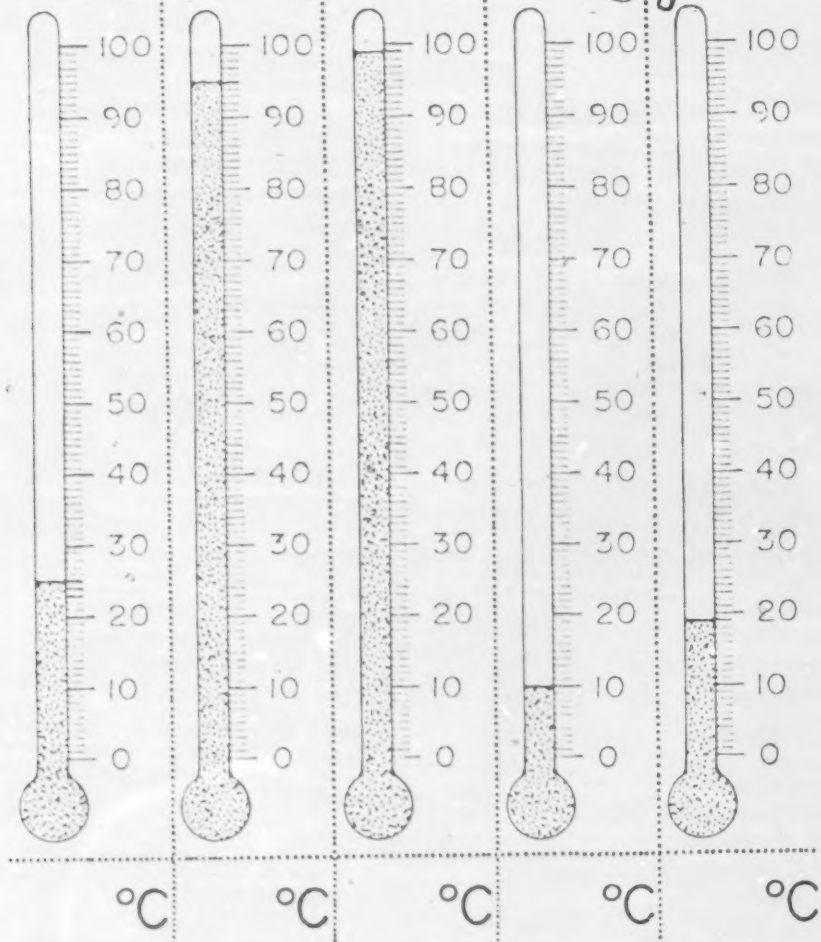
water
boils



water
freezes



normal body
temperature



54

58

WELL, FANS. DO YOU
KNOW THE IDENTITY
OF THE METRIC THIEF?
YOU HAVE ALL THE
CLUES YOU NEED.

IF NECESSARY, READ THE
MYSTERY AGAIN. WHO IS
THE THIEF? AND
WHY DID THE THIEF
STEAL THE METRIC
UNITS? GOOD LUCK!



exa means _____ 1 000 000 000 000 000 000
 peta means _____ 1 000 000 000 000 000
 tera means _____ 1 000 000 000 000
 giga means _____ 1 000 000 000
 mega means _____ 1 000 000
 kilo means _____ 1 000
 hecto means _____ 100
 deka means _____ 10
 deci means _____ 0.1
 centi means _____ 0.01
 milli means _____ 0.001
 micro means _____ 0.000 001
 nano means _____ 0.000 000 001
 pico means _____ 0.000 000 000 001
 femto means _____ 0.000 000 000 000 001
 atto means _____ 0.000 000 000 000 000 001

WHO DUNNIT?

These letters were found scattered all around Gram Mansion. Could they be the missing metric units? Unscramble them and see.



teemr _____

itler _____

ragm _____

llltiirem _____

mmiilleert _____

glliimarm _____

retemolik _____

golarmik _____

teermiecnt _____

dcltreiie _____

Discuss what metric unit
is used to measure the...



height of a person _____

weight of a person _____

distance between cities _____

amount of vitamins in foods _____

area of a floor _____

height of a house _____

length of an ant _____

width of photographic film _____

amount of gasoline in a car _____

length of a person's waist _____

amount of soda pop in a can _____

temperature in a room _____



KILOMBO IS A...

MYSTERY MESSAGE



41.15	0.140	0.06	2.22	1.2	2.300	21.6	0.26
+ 5.11	+0.103	+0.10	+0.21	+0.4	+2.326	+ 2.7	+5.06
46.26							
T							

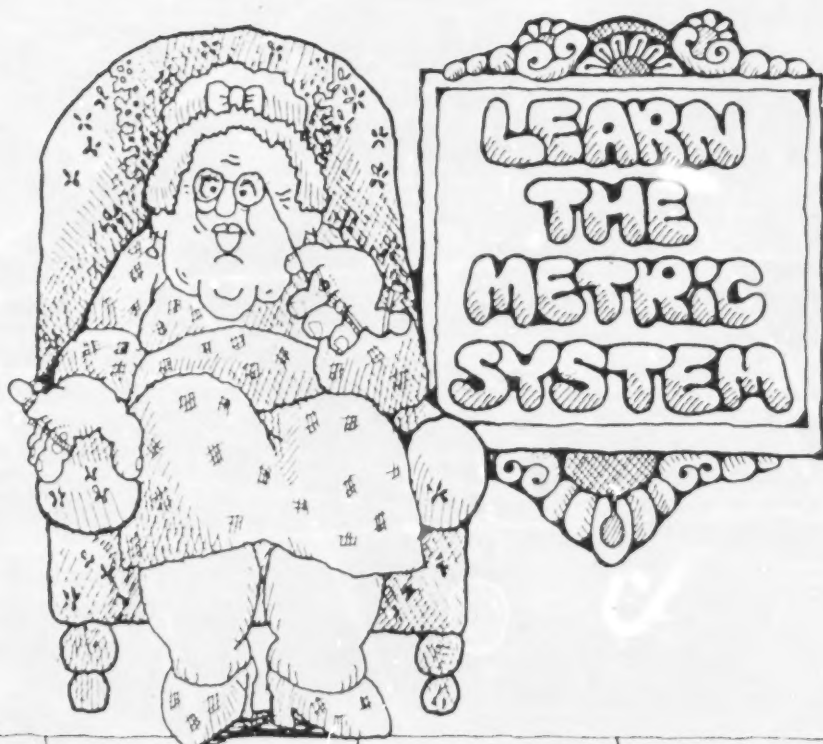
23.13	13.3	0.076	1.62	0.8
x 2	x 4	x 7	x 5	x 2

0.4	0.266	1.542	40.5	7.71	1.35	9.0
x 4	x 2	x 3	x 2	x 6	x 6	x 9

86.72	8.343	9.970	48.6
-40.46	-8.100	-5.344	-24.3

0.573	16.52
-0.330	- 8.42

3[9.63]	5[0.80]	7[1.12]	2[925.2]	9[14.4]



1000	kilometer (km)	kiloliter (kL)	kilogram (kg)
100	hectometer (hm)	hectoliter (hL)	hectogram (hg)
10	dekameter (dam)	dekaliter (daL)	dekagram (dag)
1	meter (m)	liter (L)	gram (g)
0.1	decimeter (dm)	deciliter (dL)	decigram (dg)
0.01	centimeter (cm)	centiliter (cL)	centigram (cg)
0.001	millimeter (mm)	milliliter (mL)	milligram (mg)